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Igor Ivanisevic

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EXAMINER

HO, ALLEN C

ART UNIT

PAPER NUMBER

2882

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/635,113

Applicant(s)

IVANISEVIC ET AL.

Examiner

Allen C. Ho

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 March 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-154 is/are pending in the application.
- 4a) Of the above claim(s) 28-30, 75-77, 122-124 and 148-150 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-27, 31-74, 78-121, 125-147 and 151-154 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 August 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>0903, 0104, 1204</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION***Election/Restrictions***

1. Applicant's election with traverse of Species 1 in the reply filed on 30 March 2006 is acknowledged. The traversal is on the ground(s): (A) The inventions are not independent or distinct as claimed; and (B) There would not be a serious burden on the examiner. These arguments are not found persuasive.

With regard to the first argument, the applicants cited the specification to support that Species 1 and Species 2 are not independent or distinct from each other because the disorder simulation may also involve receive a data file as an input and pre-processing steps. This argument is not persuasive. First of all, the examiner would like to point out that even though Species 2 may start with a measured x-ray diffraction pattern peak list, it is still considered an initial assumption because the diffraction peak list simply provides a starting point for the simulation. In other words, the source of the initial assumption is irrelevant; it could be based on actual data or other calculations. Second, the species are not defined by these features alone. The species must be considered in view of all of the processing steps. Species 1, as shown in Fig. 2, illustrates a method that performs Hierarchical Cluster Analysis on received x-ray diffraction patterns. Species 2, as shown in Fig. 29, illustrates a method that simulates disorder and matches the simulated disorder patterns with x-ray diffraction patterns. Clearly, the two species are independent and distinct when all the processing steps are considered.

With regard to the second argument, the examiner would like to point out that separate searches must be performed because the two species are independent and distinct from each

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other. This presents a serious burden on the examiner because each search involves non-patent literature as well as patent documents.

The requirement is still deemed proper and is therefore made FINAL.

Drawings

2. Fig. 24 is objected to because "March" should be replaced by --Match-- in step 2420. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

3. Claim 6 is objected to because of the following informalities:

Claim 6 recites the limitation "the broad feature". There is insufficient antecedent basis for this limitation in the claim.

Appropriate correction is required.

4. Claims 13, 15-19, and 35 are objected to because of the following informalities:

Claim 13 recites the limitation "detecting characteristic peaks". There is insufficient antecedent basis for this limitation in the claim.

Appropriate correction is required.

5. Claim 14 is objected to because of the following informalities:

Claim 14 recites the limitation "matching the diffraction patterns". There is insufficient antecedent basis for this limitation in the claim.

Appropriate correction is required.

6. Claims 16-19 and 35 are objected to because of the following informalities:

Claim 16 recites the limitation "matching the diffraction patterns based on detected characteristic peaks". There is insufficient antecedent basis for this limitation in the claim.

Appropriate correction is required.

7. Claims 20-24 and 26 are objected to because of the following informalities:

Claims 20-24 recite the limitation "pre-processing the diffraction patterns". There is insufficient antecedent basis for this limitation in the claim.

Appropriate correction is required.

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8. Applicant is advised that should claim 5 be found allowable, claim 20 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

9. Claim 21 is objected to because of the following informalities:

"scaling into a common measurement range the diffraction pattern" should be replaced by --scaling the diffraction patterns into a common measurement range--.

Appropriate correction is required.

10. Claim 22 is objected to because of the following informalities:

"scaling into a common step size the diffraction patterns" should be replaced by --scaling the diffraction patterns into a common step size--.

Appropriate correction is required.

11. Applicant is advised that should claim 2 be found allowable, claim 23 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

12. Claim 32 is objected to because of the following informalities:

Line 1, "21" should be replaced by --31--.

Appropriate correction is required.

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13. Applicant is advised that should claim 8 be found allowable, claim 34 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

14. Claims 50-56 are objected to because of the following informalities:

Line 1, "49" should be replaced by --48--.

Appropriate correction is required.

15. Claim 57 is objected to because of the following informalities:

Line 1, "1" should be replaced by --48--.

Appropriate correction is required.

16. Claims 60, 62-66, and 82 are objected to because of the following informalities:

Claim 60 recites the limitation "detecting characteristic peaks". There is insufficient antecedent basis for this limitation in the claim.

Appropriate correction is required.

17. Claim 61 is objected to because of the following informalities:

Claim 61 recites the limitation "matching the diffraction patterns". There is insufficient antecedent basis for this limitation in the claim.

Appropriate correction is required.

18. Claims 63-66 and 82 is objected to because of the following informalities:

Claim 63 recites the limitation "matching the diffraction patterns based on the detected characteristic peaks". There is insufficient antecedent basis for this limitation in the claim.

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Appropriate correction is required.

19. Claims 67-71, 73, and 79 are objected to because of the following informalities:

Claims 67-71 recite the limitation "pre-processing the diffraction patterns". There is insufficient antecedent basis for this limitation in the claim.

Appropriate correction is required.

20. Applicant is advised that should claim 52 be found allowable, claim 67 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

21. Applicant is advised that should claim 49 be found allowable, claim 70 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

22. Claim 79 is objected to because of the following informalities:

Line 1, "68" should be replaced by --78--.

Appropriate correction is required.

23. Applicant is advised that should claim 55 be found allowable, claim 81 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing,

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despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

24. Claims 107, 109-113, and 129 are objected to because of the following informalities:

Claim 107 recites the limitation "detecting characteristic peaks". There is insufficient antecedent basis for this limitation in the claim.

Appropriate correction is required.

25. Claim 108 is objected to because of the following informalities:

Claim 108 recites the limitation "matching the diffraction patterns". There is insufficient antecedent basis for this limitation in the claim.

Appropriate correction is required.

26. Claims 110-113 and 129 are objected to because of the following informalities:

Claim 110 recites the limitation "matching the diffraction patterns based on the detected characteristic peaks". There is insufficient antecedent basis for this limitation in the claim.

Appropriate correction is required.

27. Claims 114-118 are objected to because of the following informalities:

Claims 114-118 recite the limitation "pre-processing the diffraction pattern". There is insufficient antecedent basis for this limitation in the claim.

Appropriate correction is required.

28. Applicant is advised that should claim 99 be found allowable, claim 114 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing,

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despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

29. Applicant is advised that should claim 96 be found allowable, claim 117 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

30. Claim 126 is objected to because of the following informalities:

Line 1, "115" should be replaced by --125--.

Appropriate correction is required.

31. Applicant is advised that should claim 102 be found allowable, claim 128 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

32. Claim 151 is objected to because of the following informalities:

Line 2, the second "pattern" should be replaced by --patterns--.

Appropriate correction is required.

Claim Rejections - 35 USC § 101

33. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

34. Claims 95-121, 125-141, 144, 147, and 154 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Claims 95-121, 125-141, 144, 147, and 154 claim machine-readable magnetic media. The applicants disclosed that machine-readable media includes a carrier wave received from the internet (paragraph [152]), which is non-statutory subject matter. MPEP § 2106.

Claim Rejections - 35 USC § 102

35. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

36. Claims 48-74, 78-94, 143, 146, 149, and 153 are rejected under 35 U.S.C. 102(b) as being anticipated by Chandler *et al.* (U. S. Patent No. 5,870,697).

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With regard to claims 48-94, 143, 146, 149, and 153, Chandler *et al.* disclosed a system comprising: a memory (random access memory, internal hard disk); and a processor (CPU) coupled to the memory (column 5, lines 17-28).

The recitation "a processor coupled to the memory for:" raises the issue that the functions are optional and do not impart limitations on the processor. Language that suggests or makes optional but does not require steps to be performed or does not limit a claim to a particular structure does not limit the scope of a claim or claim limitation. MPEP § 2106. An apparatus must be structurally distinguished from the prior art. MPEP § 2114. A memory and a processor are not distinguishable from the prior art.

Furthermore, Chandler *et al.* disclosed all of the positively recited structures of the claims, *i. e.*, a memory and a processor. As such, the processor disclosed by Chandler *et al.* is as capable of performing the functions as the processor recited in the claims.

37. Claims 1, 3, 10, 11, 13-19, 25, 31, 32, 35, 39-43, 142, 145, and 151 are rejected under 35 U.S.C. 102(e) as being anticipated by Raich (U. S. Pub. No. 2006/0015265 A1).

With regard to claim 1, Raich disclosed a method of analyzing diffraction patterns, comprising: receiving a first diffraction pattern; receiving a first diffraction pattern; receiving a second diffraction pattern; receiving a third diffraction pattern (paragraph [0017]); determining a first similarity between the first and the second diffraction patterns; determining a second similarity between the first and the third diffraction patterns; determining a third similarity between the second and the third diffraction patterns (paragraph [0018]); and performing hierarchical cluster analysis on the first, the second, and the third diffraction pattern based on the determined first similarity, the second similarity, and the third similarity (paragraph [0018]).

With regard to claim 3, Raich disclosed the method of claim 1, further comprising angle truncation of the diffraction patterns (paragraph [0026], lines 9-12).

With regard to claims 10 and 43, Raich disclosed the method of claim 1, wherein the similarities are determined based on the characteristic peaks of the diffraction patterns (paragraph [0026], lines 10-22).

With regard to claim 11, Raich disclosed the method of claim 10, wherein determining the similarities based on the peaks comprises: detecting crystalline peaks in the diffraction patterns (when the material is crystalline); and matching the diffraction patterns based on the detected crystalline peaks (paragraph [0018]).

With regard to claim 12, Raich disclosed the method of claim 10, wherein determining the similarities based on the peaks comprises: detecting amorphous peaks in the diffraction patterns (when the material is amorphous); and matching the diffraction patterns based on the detected crystalline peaks (paragraph [0018]).

With regard to claims 13, 15-19, and 35, Raich disclosed the method of claim 10, further comprising: determining the characteristic peaks of the diffraction patterns (paragraph [0026], lines 10-18), assigning probability scores (similarity or distance) to the determined characteristic peaks of the diffraction pattern (paragraph [0026], lines 19-22); and discretely allocating the determined characteristic peaks into one or more groups (cluster) based on the assigned probability scores (Fig. 1).

With regard to claim 14, Raich disclosed the method of claim 10, further comprising comparing one or more detected characteristic peaks in the first diffraction pattern with one or

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more detected characteristic peaks in the second diffraction pattern (paragraph [0026], lines 10-25).

With regard to claim 25, Raich disclosed the method of claim 1, wherein determining the similarity between the first diffraction pattern and the second diffraction pattern further comprises matching the intensity envelopes of the first diffraction pattern with the second diffraction pattern. Since Raich disclosed matching/grouping according to the sum of the differences in intensities between two patterns at each 2θ (paragraph [0018]), the intensity envelopes are also included.

With regard to claims 31 and 32, Raich disclosed the method of claim 1, wherein the hierarchical cluster analysis further comprises determining a cut off similarity of a dendrogram (Fig. 1).

With regard to claim 39, Raich disclosed the method of claim 1, wherein performing hierarchical cluster analysis further comprises using the minimum link methodology (nearest neighbor, paragraph [0017]).

With regard to claim 40, Raich disclosed the method of claim 1, wherein performing hierarchical cluster analysis further comprises using the average link methodology (unweighted pair-group average and weighted pair-group average, paragraph [0017]).

With regard to claim 41, Raich disclosed the method of claim 1, wherein performing hierarchical cluster analysis further comprising using the maximum link methodology (furthest neighbor, paragraph [0017]).

With regard to claim 42, Raich disclosed a method of claim 1, wherein hierarchical cluster analysis comprises identifying one or more clusters and further comprising identifying clusters that are mixtures of other clusters (Fig. 1).

With regard to claim 142, Raich disclosed a method of analyzing diffraction patterns, comprising: receiving a first diffraction pattern; receiving a first diffraction pattern; receiving a second diffraction pattern; receiving a third diffraction pattern (paragraph [0017]); determining a first similarity between the first and the second diffraction patterns based on the characteristic peaks of the first and the second diffraction patterns; determining a second similarity between the first and the third diffraction patterns based on the characteristic peaks of the first and the third diffraction patterns; determining a third similarity between the second and the third diffraction patterns based on the characteristic peaks of the second and the third diffraction patterns (paragraph [0026], lines 10-22); and performing hierarchical cluster analysis on the first, the second, and the third diffraction pattern based on the determined first similarity, the second similarity, and the third similarity (paragraph [0026], lines 10-22).

With regard to claim 145, Raich disclosed a method of analyzing diffraction patterns, comprising: receiving a first diffraction pattern; receiving a first diffraction pattern; receiving a second diffraction pattern; receiving a third diffraction pattern (paragraph [0017]); determining a first similarity between the first and the second diffraction patterns based on the intensity envelopes (peaks) of the first and the second diffraction patterns; determining a second similarity between the first and the third diffraction patterns based on the intensity envelopes (peaks) of the first and the third diffraction patterns; determining a third similarity between the second and the third diffraction patterns based on the intensity envelopes (peaks) of the second and the third

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diffraction patterns (paragraph [0026], lines 10-22); and performing hierarchical cluster analysis on the first, the second, and the third diffraction pattern based on the determined first similarity, the second similarity, and the third similarity (paragraph [0026], lines 10-22).

With regard to claim 151, Raich disclosed a method of matching patterns, comprising: performing pattern matching on three or more patterns to determine similarities between the patterns (comparing patterns to determine similarity between the patterns, paragraph [0018]); and performing hierarchical cluster analysis on the three or more patterns based on the determined similarities (paragraph [0018]).

Claim Rejections - 35 USC § 103

38. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

39. Claims 2, 4-9, 20, 23, 24, 26, 27, 33, 36-38, 44, 46, and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Raich (U. S. Pub. No. 2006/0015265 A1) as applied to claims 1, 10, and 25 above, and further in view of Cullity and Stock.

With regard to claims 2 and 23, Raich disclosed the method of claim 1. However, Raich failed to disclose a step of normalizing the intensity of the diffraction patterns.

Cullity and Stock disclosed a method of analyzing diffraction patterns comprising a step of normalizing the intensity of the diffraction patterns. Each diffraction pattern (Fig. 9-1) in the

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Powder Diffraction File (PDF) contains a set of relative line intensities (I/I_1) normalized to I_1 , the peak in the diffraction pattern with maximum intensity (p. 278).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to normalize the intensity of the diffraction patterns, since a person would be motivated to identify a material by comparing normalized intensities of a diffraction pattern with the PDF.

With regard to claim 4, Raich disclosed the method of claim 1. However, Raich failed to disclose a step of compensating the baseline of the diffraction pattern.

Cullity and Stock disclosed a method of analyzing diffraction patterns comprising a step of compensating the baseline (background) of the diffraction pattern (p. 234, lines 3-6).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to compensate the baseline of the diffraction pattern, since a person would be motivated to ascertain a center of a diffraction peak by fitting the diffraction peak to a known symmetric function such as Gaussian and Lorentzian.

With regard to claims 5 and 20, Raich disclosed the method of claim 1. However, Raich failed to disclose a step of smoothing the diffraction patterns.

Cullity and Stock disclosed a method of analyzing diffraction patterns comprising a step of smoothing the diffraction patterns (p. 231, last line to p. 232, line 2).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to smooth the diffraction patterns, since a person would be motivated to ascertain a shape of a diffraction peak by removing statistical noises superimposed on the diffraction peak.

With regard to claim 6, Raich disclosed the method of claim 1. However, Raich failed to disclose a step of removing a broad feature of the diffraction patterns.

Cullity and Stock disclosed a method of analyzing diffraction patterns comprising a step of removing (subtracting) a broad feature (background) of the diffraction patterns.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to remove (subtract) a broad feature (background) of the diffraction patterns, since a person would be motivated to ascertain a center of a diffraction peak by fitting the diffraction peak to a known symmetric function such as Gaussian and Lorentzian.

With regard to claim 7, Raich disclosed the method of claim 1. However, Raich failed to disclose a step of computing the variance of the diffraction pattern.

Cullity and Stock disclosed a method of analyzing diffraction patterns comprising a step of computing the variance of the diffraction patterns (p. 220, last paragraph). Cullity and Stock taught that probable error in the measured intensity of a diffraction line above background increases as the background intensity increases.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to compute the variance of the diffraction patterns, since a person would be motivated to ascertain a probable error in the measurement.

With regard to claims 8 and 34, Raich disclosed the method of claim 1. However, Raich failed to disclose a step of detecting the potential presence of preferred orientation and particle statistics of the diffraction patterns.

Cullity and Stock disclosed a method of analyzing diffraction patterns comprising a step of detecting the potential presence of preferred orientation and particle statistics of the diffraction

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patterns. Cullity and Stock taught that large grains would produce abnormally large intensities (p. 292), which leads to difficulty in identifying a material.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to detect the potential presence of preferred orientation and particle statistics of the diffraction patterns, since a person would be motivated to positively identify a material by taking preferred orientation into account.

With regard to claim 9, Raich and Cullity and Stock disclosed the method of claims 1-8.

With regard to claim 24, Raich and Cullity and Stock disclosed the method of claims 1 and 20-23.

With regard to claim 26, Raich and Cullity and Stock disclosed the method of claim 24, wherein determining the similarity between the first diffraction pattern and the second diffraction pattern further comprises matching the intensity envelopes of the first diffraction pattern with the second diffraction pattern. Since Raich disclosed matching/grouping according to the sum of the differences in intensities between two patterns at each 2θ (paragraph [0018]), the intensity envelopes are also included.

With regard to claim 27, Raich disclosed the method of claim 25. However, Raich failed to disclose performing a least-squares fitting of the first diffraction pattern and the second diffraction pattern.

Cullity and Stock disclosed a method of analyzing diffraction patterns comprising determination of diffraction peak positions by performing a least-squares fitting of the first diffraction pattern and the second diffraction pattern (p. 231-234).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to perform a least-squares fitting of the first diffraction pattern and the second diffraction pattern, since a person would be motivated to obtain a functional representation of the diffraction peaks that minimizes the error between the functional representation and the experimental data.

With regard to claim 33, Raich disclosed the method of claim 1, wherein the similarity between x-ray diffraction patterns is defined as the sum of the differences in intensities between the two patterns at each 2θ (paragraph [0018]). However, Raich failed to disclose x-shifting the first diffraction pattern prior to determining the similarity between the first diffraction pattern and the second diffraction pattern and determining the similarity between the first diffraction pattern and the third diffraction pattern.

Cullity and Stock disclosed a method of analyzing diffraction patterns. Cullity and Stock taught that a uniform strain causes a diffraction pattern to shift from an ideal diffraction pattern (p. 176, Fig. 5-6(b)).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to x-shift the first diffraction pattern prior to determining the similarity between the first diffraction pattern and the second diffraction pattern and the similarity between the first diffraction pattern and the third diffraction pattern, since a person would be motivated to determine a difference in intensities between two diffraction peaks due to the same Bragg planes, where one diffraction peak is obtained from a sample without strain, and the other diffraction peak is obtained from a sample under a uniform strain.

With regard to claim 36, Raich disclosed the method of claim 10. However, Raich failed to disclose that the characteristic peaks are detected based upon a threshold value.

Cullity and Stock disclosed a method of analyzing diffraction patterns comprising detecting characteristic peaks based upon a threshold value (background) (p. 234, lines 3-4).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to detect characteristic peaks based on a threshold value, since a person would be motivated to fit characteristic peaks with background subtracted.

With regard to claim 37, Raich and Cullity and Stock disclosed the method of claim 36, wherein the threshold value is based on a computed variance (Cullity and Stock, p. 220).

With regard to claim 38, Raich and Cullity and Stock disclosed the method of claim 36, wherein the threshold value is based on a noise level of the pattern (Cullity and Stock, p. 234, lines 3-4).

With regard to claim 44, Raich disclosed the method of claim 25. However, Raich failed to disclose a step of determining the crystallinity of the patterns.

Cullity and Stock disclosed a method of analyzing diffraction patterns. Cullity and Stock taught that partial crystalline materials and/or non-crystalline materials have very different scattering patterns (p. 182-183).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to determine the crystallinity of the patterns, since partial crystalline materials and/or non-crystalline materials require different analysis than the one applies to crystalline materials.

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With regard to claims 46 and 47, Raich disclosed the method of claim 1. However, Raich failed to disclose visually constructing a fourth pattern based on operator input percentages of the first pattern and second pattern.

Cullity and Stock disclosed a method of analyzing diffraction patterns. Cullity and Stock taught that the intensity of the diffraction pattern of a particular phase in a mixture of phases depends on the concentration (percentage) of that phase in the mixture (p. 348). Furthermore, a diffraction pattern of mixed phased could be analyzed by superposition of the diffraction patterns of each individual phases (Figs. 12-2 and 12-3).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to construct a fourth pattern based on operator input percentages of the first pattern and a second pattern, since a person would be motivated to analyze a diffraction pattern that contains a percentage of the first pattern and a percentage of the second pattern.

40. Claims 21, 22, and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Raich (U. S. Pub. No. 2006/0015265 A1) as applied to claims 1 and 10 above.

With regard to claims 21 and 22, Raich disclosed the method of claim 1. However, Raich failed to disclose scaling the diffraction patterns into a common measurement range and common step size.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to scale the diffraction patterns into a common measurement range and common step size, since it is easier to compare diffraction patterns having the same measurement range and the same step size (resolution).

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With regard to claim 45, Raich disclosed the method of claim 10. However, Raich failed to disclose subtracting the characteristic peaks of the first pattern from the characteristic peaks of the second pattern, wherein the subtraction completely removes matching peaks regardless of amplitude.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to subtract the characteristic peaks of the first pattern from the characteristic peaks of the second pattern, wherein the subtraction completely removes matching peaks regardless of amplitude, since a person would be motivated to remove certain matching peaks from hierarchical cluster analysis.

41. Claims 95-121 and 125-141 are rejected under 35 U.S.C. 103(a) as being unpatentable over Raich (U. S. Pub. No. 2006/0015265 A1) and Cullity and Stock.

With regard to claims 95-121 and 125-141, Raich and Cullity and Stock disclosed a method of claims 1-27 and 31-47. However, Raich and Cullity and Stock failed to disclose a machine-readable magnetic medium comprising instructions stored on the medium, the instructions when executed performs the method of claims 1-27 and 31-47.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide a machine-readable magnetic medium that stores instructions to implement the method of claims 1-27 and 31-47, since a person would be motivated to implement the method on a computer.

42. Claim 152 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lehmann (U. S. Patent No. 6,507,636 B1) in view of Raich (U. S. Pub. No. 2006/0015265 A1).

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Lehmann disclosed a method of solid form screening, comprising: solidifying (crystallizing) a material under a first condition to generate a first resulting solid (crystal); solidifying (crystallizing) a material under a second condition to generate a second solid (crystal) (column 5, lines 47 - column 6, line 11); and analyzing the first resulting solid and the second resulting solid by diffraction analysis to generate a respective first diffraction pattern and a second diffraction pattern (column 5, lines 26-45).

However, Lehmann failed to disclose the steps of determining a similarity between the first diffraction pattern and the second diffraction pattern; and performing hierarchical cluster analysis using the similarity.

Raich disclosed a method that comprises the steps of determining a similarity between the first diffraction pattern and the second diffraction pattern; and performing hierarchical cluster analysis using the similarity. Raich taught that this method rapidly identifies a large number of x-ray diffraction patterns by reducing the large set of x-ray diffraction patterns into subsets of similar materials, thereby reducing the overall number of x-ray diffraction patterns that must be interpreted and/or analyzed (paragraph [0006]).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to employ the method disclosed by Raich to identify a large number of x-ray diffraction patterns, since a person would be motivated to expedite the analysis of the large number of x-ray diffraction patterns.

Conclusion

43. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:


- (1) Durst *et al.* (U. S. Patent No. 6,836,532 B2) disclosed a diffraction system for biological crystal screening.
- (2) Koinuma *et al.* (U. S. Patent No. 6,459,763 B1) disclosed a combinatorial x-ray diffractometer.
- (3) Newman *et al.* (U. S. Pub. No. 2002/0067800 A1) disclosed an apparatus and a method for identification of crystals by *in-situ* x-ray diffraction.
- (4) Murray, Jr. *et al.* (U. S. Patent No. 6,327,334 B1) disclosed method of rapid screening x-ray powder diffraction pattern.
- (5) Vidal *et al.*, "Multivariate cluster analysis of trace elements and mineralogical components from some rural soils," Development and Application of Computer Techniques to Environmental Studies VI, Proceedings of Sixth International Conference ENVIROSOFT 1996, p. 215-224.
- (6) Infometrix, Inc., "Description of Pirouette Algorithms," Chemometrics Technical Note, 1993, p. 1-4.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Allen C. Ho whose telephone number is (571) 272-2491. The examiner can normally be reached on Monday - Friday from 8:00 am - 5:00 pm.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward J. Glick can be reached at (571) 272-2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Allen C. Ho
Primary Examiner
Art Unit 2882

11 April 2006